# Background Report:
# Natural Resources Element of the New Town Plan

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Planning, Zoning and Development Department

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# Background Report:
# Natural Resources Element of the New Town Plan

This report is written to provide a basis for the preparation of the natural resources element of a new Leesburg town plan. The report summarizes the environmental element of the 1997 Town Plan and compares the policies and objectives found therein to the environmental and natural resource management recommendations made by the community at the sector and visioning meetings conducted by the Town in the summer and fall of 2003. A summary of the recommendations collected at these meetings was reported to the three commissions, and members of the community on June 17, 2004, at the "Workshop on Public Comment Themes."

This report also assesses the strengths and weaknesses of the 1997 Town Plan related to its coverage of environmental issues, and notes whether progress has been made in achieving the 1997 Town Plan's objectives. Relevant sections of the Loudoun County General Plan and other documents are reviewed to determine how their policy guidance compares with the environmental goals and objectives of the town. In addition, it includes a review of existing conditions and trends to determine how changing conditions might affect the goals, objectives and policies of the new element. The report addresses the above information with a series of findings that provides direction for writing the new natural resources element and concludes with a set of draft goals, and objectives.

## Summary of the Environmental Element of the 1997 Town Plan

The environmental element of the 1997 Town Plan is divided into two principal parts and several subsections. Pages 2-1 through 2-15 provide maps and background information on eight environmental topics: steep slopes, geology and soils, water resources, vegetation, noise, energy, solid waste, and non-point source pollution. No hierarchy of topics or issues is apparent. Each section provides some background material and identifies issues.

- Steep Slopes. This section notes the relative dearth of steeply sloping land in the town. Steeply sloping areas are characterized primarily as constraints to development, and as component parts of stream valleys.
- Geology and Soils. The stability of limestone conglomerate and the health hazards of radon are highlighted in the geology subsection. The soils subsection supports continued agricultural uses north and south of town, based on the presence of prime agricultural soils. Shrink-swell soils over diabase are also mentioned as a construction constraint.
- Water Resources. The plan divides water features into four categories. The first of these is watersheds and floodplains. This section notes the relationship between sewersheds and watersheds. The text finds floodplain areas suitable for recreation and agriculture, which may be contrary to water quality and habitat protection principles. The principal stream and floodplain areas are noted. Second, a stream corridor section promotes the use of steams and floodplains as visual buffers and habitat areas. The third section, water quality, focuses on ground water protection specifically, and the need to adhere to regulations generally. A final section on wetlands notes their value as a filter for water quality, and as habitat, but also finds that some wetland areas can be used for recreation with little or no disturbance.
- Preservation of Natural Vegetation. This section covers two mostly unrelated topics: habitat preservation, particularly for rare species, and the virtues of an urban forestry program.

- Airport and Highway Noise. Noise mitigation policies for aircraft operations related to Leesburg Municipal Airport are established. Notification of potential homebuyers inside the Ldn 60 noise contour is required. Highway noise is dismissed as not a problem at present.
- Energy Conservation. The Plan lists a number of energy conserving measures related to transportation and mixed-use development.
- Solid Waste Management. This section discusses the town's recycling goal.
- Non-point Source Pollution. This brief section looks at underground storage tanks and erosion. It misses the issue of post development runoff completely, a significant oversight and shortcoming.

Pages 2-16 to 2-23 list the goals, policies and objectives for the environmental element of the 1997 Town Plan. They are listed below under the topic area headings that are summarized above. Tentative reactions and deficiencies are noted. Comments concerning adherence to or progress toward meeting the objectives are included.

## Analysis of 1997 Town Plan Goals and Objectives

The plan lists three goals that are not tied to topical areas. The first calls for environmental preservation generally. The second calls for new development to "respect" the environment. The third would have the Town become a leader in environmental protection. There are also four general objectives that precede the topical objectives. These four are:

- "Preserve vegetation and sensitive environmental features through the development process.
- Identify and preserve usable open space.
- Enhance the Town's aesthetic character through preservation of significant natural features and vistas and through landscaping and tree planting in new developments.
- Reduce the potential for residents' exposure to all forms of pollution."

These four general objectives are basic to environmental planning. Together they constitute in summary an effective set of guidelines with which to assess any plan's environmental element.

The remainder of this section addresses objectives and policies by topic in the order presented by the 1997 Town Plan.

### Steep Slopes

The 1997 Town Plan recommends the preservation of steep slopes without any reference to the context of these slopes in the landscape. Steep slopes frequently are a byproduct of fluvial geomorphology. If they make up the side slope of a stream valley, their preservation can be very valuable for environmental protection. If slopes are hillsides not in proximity to a watercourse, they are a concern for different reasons, such as viewshed impacts and site design issues. If they occur as an isolated topographic anomaly, they may have less environmental importance.

The Plan provides two objectives about steep terrain. One calls for discouraging development on 25 percent slopes; the other calls for limiting development on 15-25 percent slopes.

In the policies section, a series of five policies repeat the plan's recommendation to limit development on these slopes. The Plan also calls for preservation of vegetation on these slopes and the use of BMPs (best management practices) when grading and clearing does take place. Specific BMPs for the protection of steep slopes are not identified.

Accomplishments: There is no evidence that the Town has implemented measures to protect steep slopes. Steep slopes are addressed only peripherally in the Design and Construction Standards Manual, and not at all in the Zoning Ordinance. Steep slope protection objectives have also not always been implemented through development review. The Beauregard Estates subdivision is an example of the outcome of this failure. There is a very steep area adjacent to the Tuscarora Creek floodplain within this development. Homes have been developed on these slopes, and much of the steepest area adjacent to the creek has been included in back yards. All of these slopes are a part of the Tuscarora Creek stream valley, and should have been preserved as passive open space and part of a greenway.

Related Community Issues and Comments: There was little community input on this topic. The participants discussed the context of steep slope protection without reaching a conclusion. One participant wanted to preserve steep slopes with openness. It is not clear what "with openness" means. Perhaps "open space" was the intended language.

Conclusion: Preservation of steep slopes is not a compelling issue for the community, if the lack of input is a fair measure of interest. On the other hand, the plan provides a significant but misdirected amount of attention to steep slopes. They are singled out as an environmental issue in the plan, and given a place of prominence by virtue of being the first topic in the environmental element. Although the presence of steep slopes can be highly significant in shaping the physical development of the Town, not all steep slopes are of equal importance. The most significant are stream valley side slopes that are an integral part of stream corridors. Clearing and grading on such slopes causes immediate harm to water quality and lasting damage to aquatic habitats. Development on such slopes narrows the stream buffer, degrading the potential of the remaining stream valley to function as a wildlife corridor and stormwater filter. This issue is addressed further under "water-related resources."

Recommendation: Steep slopes, or topography in general, should not be a separate topic in the new natural resources element. Topography is of some significance because it can be a parameter used to determine the extent of a stream corridor, and will likely be a criterion used in developing an open space policy for the Town. Steep slopes also exacerbate erosion during and after development, contributing to loss of topsoil and sedimentation of water bodies. Therefore, the section on stream corridors and/or open space in the new natural resources element should address steep slopes.

## Geology and Soils

The geology subsection discusses two topics: limestone geology and radon gas. Poor soils and geological constraints can increase site development costs and contribute to building maintenance issues. Radon is a human health concern. However, neither geology in general or limestone soils specifically should favor one land use over another, unless a site is so constrained that it should be left as open space. Therefore, although they may be site constraints, geology and soils are parameters that should not impact the distribution of land uses in Leesburg.

There are two objectives in the 1997 Town Plan addressing geological concerns. The first calls for minimizing hazards to human health, the environment, and property in limestone conglomerate areas. How this would be done is not clear. Limestone geology is a concern because contaminants can easily enter and propagate through groundwater in this formation. Also, in extreme cases sudden ground failure can produce foundation failure and sinkholes. Both eventualities are human health concerns. The second objective calls for radon detection and mitigation. This may be a significant health concern for homeowners, but because radon hazards can be mitigated, its presence should not effect land use decisions. The policies section contains one policy suggesting a new development regulation to require radon mitigation.

There are also two objectives that pertain to soils. One of these calls for preserving prime agricultural soils for agriculture and related uses. This is a peculiar and contradictory recommendation since the Town does not plan for agricultural use within its boundaries or within the Urban Growth Area (UGA). The new town plan should not promote the preservation of its remaining agricultural operations within its corporate limits, but having the Town Plan address agricultural preservation as part of a green belt around the outskirts of the Town should be considered for inclusion in an appropriate section of the new town plan.

Accomplishments: The Design and Construction Standards Manual addresses issues relating to construction in limestone conglomerate areas in a section on geotechnical guidelines. Town ordinances do not address radon gas mitigation. Radon mitigation has not been sought in development review applications.

Related Community Issues and Comments: There were no community comments that directly address geology or soils, although there were several related recommendations that call for preserving a greenbelt within the County, around the Town.

Conclusion: The lack of community commentary and the poor relationship between this topic and the primary purpose of the Plan to guide the development of the Town suggests that geology and soils are also overemphasized in the 1997 Town Plan. Geological and soil concerns have impacts on people and property that result from environmental characteristics of the land. However, these constraints can be mitigated. Therefore, the geographical distribution of these hazards will have little impact on the physical planning of the Town. The value of agriculture serving as part of a greenbelt around the Town should be retained.

Recommendation: There are geotechnical and health issues in the 1997 Town Plan that should be updated and carried over into the new element. For example, are there Town wells that draw water from limestone aquifers? If so, could ground water withdrawals cause sinkholes? These issues fall under the "natural hazards" category, which do not provide the basis for planning the physical development of the Town. Because there is no history of seeking radon mitigation for new development in the Town (or the County), a determination should be made about the need to retain a policy on radon.

Any reference to preserving agriculture should be limited to a discussion of a green belt around the Town, or if the Town chooses to support continued agricultural uses, this should be addressed in the land use element of the new plan.

## Water-related Resources

The 1997 Town Plan discussion on water resources is divided in four subtopics. These are watersheds and floodplains, stream corridors, water quality, and wetlands. The issue of non-point source pollution is mentioned, but is also treated as a stand-alone topic later in the element. The stream corridor subtopic, which should be a critical building block of an open space system (a component of the town's green infrastructure), is introduced but poorly developed.

There are five objectives under this heading. Several objectives under the vegetation and habitat label are also related. Some of these objectives put forth very general policies such as "Meet or exceed all applicable water quality standards." Two of the objective statements could be potentially problematic, depending on how one interprets them. "Preserve and use stream corridors for recreation, open space and flood control" raises the issue of how "recreation" is defined. Active recreation, particularly if it requires site development work, is inimical to the ecology of a stream corridor. Likewise, another objective calls for preserving stream corridors for recreation and flood control. Flood control implies the construction of facilities to regulate flooding. These projects can also degrade the ecological functions of stream valleys.

The policies section for water resources is extensive. The first policy listed recommends the use of best management practices (BMPs) according to Metropolitan Washington Council of Government (COG) manuals, a good first step. There are also detailed policies (numbers 17 and 18) recommending the adoption of an ordinance to establish and protect stream corridors. These policies were implemented in 2003 with the adoption of the creek valley buffer regulations, Article 14 of the Zoning Ordinance. Other policy statements contribute little to the plan, such as "[t]he town requires compliance with federal and state regulations governing water quality." This is a statement of fact, because the town has no option. Other objectives are actually program statements, like "[t]he town shall review its engineering/construction requirements for water supply lines to assess their adequacy with regard to this policy." Likewise, Policy 19's call for a Potomac River Shoreline Management Plan is a project recommendation, which may help implement plan policy, but is not a policy itself.

Accomplishments: The Town has begun to address the impacts of non-point sources pollution. A Virginia Pollutant Discharge Elimination System Permit has been obtained, which commits the Town to develop stormwater management requirements to reduce non-point source pollution.

In 2003, the Town amended the Zoning Ordinance by enacting a creek valley buffer section to implement a 1997 Town Plan policy to create stream buffers. This action, which was an environmental milestone, provides a basis to begin to protect the Town's stream valleys. The ordinance does not provide protection for small headwater streams or any stream with a watershed smaller than one square mile.

Related Community Issues and Comments: There were a few very general community comments on water resources, such as: "Preserve natural features, for example, creeks," or "Preserve land within stream corridor overlay." However, the participants at an environmental visioning session made many helpful observations concerning opportunities along Tuscarora Creek, including opportunities for open space preservation, trails, and corridor linkages. They noted the impacts of urban development on water quality, the role of federal wetland regulations, the conflict between

protecting natural systems and flood control, and the tension between the need to protect the public welfare and private property rights.

Conclusion: The Town Plan has a lot to say about water resources, as it should. No other natural system is so impacted by human activity, especially land use. No other natural system provides as much visual evidence that it is in distress. However, the plan fails to develop the idea that the Town's water resources could provide a platform for the development of an open space system or become an element of the town's green infrastructure. Several federal regulations impact the management of the Town's water resources. These regulations are intended to protect downstream waters, including the Chesapeake Bay from pollution sources like those in the Town.

The visioning session comments provide a theme for developing a set of policies around the protection and restoration of the Town's waterways, particularly Tuscarora Creek and Town Branch. Tuscarora Creek and its tributaries flow across the Town from west to east. Map 2 (see Existing Conditions, Trends, and Changes Since 1997), which shows Leesburg's water resources, illustrates how the creek neatly bisects the Town. It is a boundary for many neighborhoods, and a barrier for movement, since few roads bridge it. By any measure, it is a significant feature of the Town. However, the current pattern of development in the Town emphasizes the problems it creates more than the opportunities it affords. Many industrial uses east of the Bypass have unattractive storage areas backing onto the Tuscarora stream valley. Likewise, many residential areas have back yards that fence off sections of floodplain impairing its ability to function as a habitat and wildlife corridor.

Sycolin Creek and Cattail Branch are similar, significant natural features affecting the northern and southern edges of Town and the UGA.

Recommendation: The new plan should use the Town's water resources to create an open space architecture for Leesburg. Some very good work has already been done as a result of the 1997 Town Plan by the adoption of the Creek Valley Buffer Article of the Zoning Ordinance. Tuscarora Creek, Goose Creek, Sycolin Creek, and Cattail Branch could serve as the framework for a green architecture for the Town and the UGA, if the new plan promulgates appropriate policies to do this. This open space network could become the backbone for the environmental infrastructure for the Town. The land use, parks and recreation, and transportation elements will all need to reflect and support this concept, by being sensitive to the location and extent of the Town's water resources. The concept is discussed in more detail in the final sections of this report.

## Preservation of Natural Vegetation

The 1997 Town Plan touches lightly on the virtues of vegetation for microclimate mitigation, scenery, and wildlife habitat. Urban forestry is also emphasized, but primarily as an amenity in the built environment rather than as a tool to develop and manage an open space system.

The Plan's goals and objectives section is more elaborate than the element's modest background material, offering a number of useful objectives and policies. Under the "General Objectives" heading is a useful statement, "Preserve vegetation and sensitive environmental features through the development review process." This statement in a sentence captures the role the environmental element of any plan should be designed to perform to guide new development. The Plan should

contain policies similar to this, but with more precise guidance for citizens, staff, elected and appointed officials and applicants to ensure that development proposals respect the more significant ecological amenities of developing sites. A second general objective calls for preservation of natural features, as well as landscaping and tree planting. This objective is an amalgam of two separate recommendations. Under the heading "Preservation and Enhancement of Natural Vegetation and Wildlife Habitats," the Plan calls for preservation of ecological communities of high value, minimization of damage to natural areas from new development, restoration of degraded areas and protection of communities with rare and endangered species. Each of these objectives is key to developing an environmental assessment process for new development, and should be carried forward into the new plan.

Under the heading "Preservation and Enhancement of Trees" are a series of policy and program statements, none of which provides any objectives for tree preservation or planting, except for a single objective calling for limits of clearing for site development.

Accomplishments: The Design and Construction Standards Manual and the Zoning Ordinance have tree canopy and street tree requirements for new development. The guidance provided in the Design and Construction Standards Manual is very general and reads like a list of suggestions. Likewise the tree canopy requirements of the Zoning Ordinance are minimal. Experience also suggests that the Town is not meeting tree canopy objectives. A land cover study discussed in the existing conditions section of this paper shows how rapidly the town has lost tree cover recently.

Related Community Issues and Comments: Based on input from the community participation process, it can be concluded that the public supports maintaining tree cover and planting new trees. Heritage High students, Environmental Advisory Commission (EAC) members, and assorted citizens provided a dozen recommendations. Most were very general, for example "protect the environment and plant trees." Several dealt with the landscape value of street trees, particularly in the historic district. Others were concerned with the loss of the forest as a habitat. Several spoke about establishing Town policies to avoid the loss of additional trees.

There were also many community comments on preserving open space and environmental amenities, which relate at least indirectly to preservation of vegetation. Likewise there were comments recommending a green belt, a better definition of open space, and honoring natural systems. Under the "Issues to be resolved" heading from the large-group mapping exercise comes this key recommendation: "Better define 'open space' types and values in context of Leesburg's urban environment (link to zoning, Development and Construction Standards Manual, etc.)." This recommendation demonstrates awareness that there are several types of open space ranging from unmanaged natural areas to manicured gardens and recreation facilities. Each type can be a component of a greenway system.

Conclusion: Both the 1997 Town Plan and the community support protecting existing tree cover, and pursuing a vigorous urban forestry program, particularly in the historic district. However, there are two separate sets of concerns under the "trees" heading. One emphasizes the value of trees in the urban environment as an element of the streetscape and as a landscaping medium. In this case, the emphasis is on the role of trees in the midst of the built environment. The second set of issues deals more generally with the protection or restoration of trees as part of the forest canopy.

The Town Plan and the community comments also provide support for the maintenance of natural vegetation (habitats) expressed as a desire for more open space, a greenbelt, natural systems, etc. What is missing is any kind of a comprehensive policy seeking the preservation or restoration of parts of the natural environment. The 1997 Town Plan appears to want to ask for this, but does not articulate a definition of what natural open space ought to include or establish a policy to conserve it.

Recommendation: As suggested in the recommendation section for water resources, the new plan should establish comprehensive open space identification, preservation, and restoration policies. Many elements addressed under the topical headings of the 1997 Town Plan environmental element address components of a natural system, but nowhere are they integrated into a systems-based, open space policy. Topography, natural vegetation, and water resources are all sources for the parameters that could define a natural open space system. Such an open space system in turn would be the "natural" part of Leesburg's green infrastructure. The discussion of these components of an open space system should be integrated in the natural resources element to achieve this end. Trees, as a component of native habitats (forest canopy), should be a part of this integrated open space policy. However, trees as a landscape medium should not. Therefore, urban forestry, at least as it applies to street trees and landscaping, should be moved from the environmental element to the land use element under a landscaping and design subheading, or be placed in a new urban design element, if there is one.

## Airport and Highway Noise

The 1997 Town Plan addresses airport noise by establishing requirements for mitigation for new residential development located between the dBA Ldn 65 and 60 noise contours. Residential development within the dBA Ldn 65 contour is prohibited. This part of the policy is reasonable and consistent with federal guidelines. However, the other elements of the airport noise policy are overly conservative, imposing restrictions and mitigation where none is needed. The Plan requires notification of prospective home purchasers within a one-mile radius of the dBA Ldn 60 contour. New homes built on land located between the dBA Ldn 60 and 65 contours are required to meet a 45db(A) noise maximum. It may be difficult or impossible to meet this noise standard because single events could easily exceed the standard. Fairfax County uses the Ldn metric for the standard to be consistent with the scale used to measure the noise source to which the mitigation is directed. This metric is a weighted average of events over a typical 24-hour period with a 10-decibel penalty added to noise events occurring between 11 PM and 7 AM. Individual events will exceed the 45-decibel level, without exceeding the standard because the standard is a weighted average. It is noteworthy that the airport noise regulations in the zoning ordinance use this weighted average, the Ldn metric.

Likewise, the one mile wide oval surrounding the dBA Ldn 60 contour, which is used to establish the geography of the notification requirement, is also excessive. The policy implies that noise exposure levels are similar along the boundary of this oval. In fact listeners perpendicular to and one mile away from the airport runway will probably enjoy an acoustical environment devoid of aircraft noise. Listeners one mile from and in line with the end of the runway may be exposed to aircraft noise only 2 or 3 decibels below the dBA Ldn 60 level. These are two very different acoustical environments.

The Plan provides little guidance on highway noise, stating that it is "not yet a serious problem" without providing any basis for reaching such a conclusion. It is interesting that both the Zoning Ordinance and the Design and Construction Standards Manual have sections regulating highway noise. Apparently, the Town does not have a tool to estimate highway noise impacts on new development, because there are no design or performance standards associated with highway noise mitigation.

The objectives section of the 1997 environmental element has a single generic objective that calls for regulating noise-sensitive development in impacted areas. There are three policies for this topic. The first calls for the Town to apply Loudoun's Dulles Airport noise policies to Leesburg Municipal Airport. These policies, which are in the Loudoun County General Plan, are similar to the airport noise policies in the 1997 Town Plan. The second policy recommends mitigation for residential development from highway noise. This is both the first and only time the 1997 Town Plan addresses highway noise mitigation. The third policy calls for buffering residential uses from industrial noise. Industrial noise is generally handled by ordinance, although the Town Code does not have a numerical noise standard.

Accomplishments: The Zoning Ordinance has an Airport Overlay District, which implements the airport noise mitigation objectives of the 1997 Town Plan. The Zoning Ordinance also has a Noise Abatement Corridor Overlay District that addresses highway noise. The text refers applicants to a section of Design and Construction Standards Manual for implementation standards. These standards are based on a different noise metric from the airport noise standards, which is confusing.

The 1997 Town Plan includes land use recommendations that would minimize the amount of new residential development near the airport. Unfortunately, several residential rezonings were approved in this area, compromising these policies.

Related Community Issues and Comments: There were several noise related comments. One from the issues to be resolved on a discussion list reads: "Find way to mitigate noise and encroachment." One of the mapping group exercises, under the heading "threat" cited "Airport threat to noise pollution." Another participant sought noise regulations for sources such as motorcycles. The environmental visioning group cited noise as an issue related to the Bypass, industrial uses, and as an impact on the Old and Historic District.

Conclusion: Transportation generated noise is an example of an impact of human activity on other humans. The current plan is too conservative in taking issue with aircraft noise from Leesburg Municipal Airport, and, conversely, virtually ignores the impacts of highway noise. However, both the Zoning Ordinance and the Design and Construction Standards Manual regulate aircraft and highway noise.

Recommendation: Leesburg's transportation sources noise policy should be recast based on federal guidelines that are more easily enforced. These standards have been static for the most part over the last 25 years. The accepted standard for acoustical treatment in new residential construction is the selection of building materials and engineering practices that achieve an ambient interior noise level of dBA Ldn 45. Residential development should also provide an area for outdoor use that can be shielded if necessary to achieve an exterior maximum noise exposure of dBA Ldn 65. The exterior standard can be met by constructing berms or barriers, or can be achieved through setbacks.

The building industry's emphasis on energy conservation has resulted in increased use of wall and ceiling insulation and double-glazing. Most new construction requires little or no additional design modification to meet the dBA Ldn 45 acoustical standard in an area impacted by noise levels between dBA Ldn 65 and 70. Homes that will be exposed to noise levels above dBA Ldn 70 have to use more expensive, non-standard building materials and construction techniques to meet the dBA Ldn 45 interior standard. The new plan should establish policies to require noise mitigation for new homes and other noise sensitive uses in impacted areas.

## Energy Conservation

The 1997 Plan contains suggestions for conserving energy, some of which can be implemented through the physical planning of the Town and encouragement of certain site planning techniques. These include mixed-use development, energy conserving site layout, landscaping practices, and non-motorized circulation. Although the 1997 Town Plan does not include a section on air quality, many of the measures that can be taken to conserve energy also benefit air quality.

There are no objectives for energy conservation in the objectives section of the 1997 Town Plan, although there are two related policies that parallel the Plan text for the topic, but do not offer specific proposals.

Energy use, and the global warming that is directly related to the burning of fossil fuels to produce this energy, can be addressed to a limited extent in the Town Plan. However, many potential plan policies that can contribute to energy conservation are difficult to implement. Several design guidelines for site planning and building orientation can achieve passive energy savings, but in practice these techniques often conflict with other planning objectives. For example, the plan could recommended that new homes be oriented to achieve a southern exposure to take advantage of passive solar energy, while urban design guidelines might eschew reverse frontage lots which in a hypothetical case may be the only way to achieve optimum solar orientation. Nevertheless, the Town's land use, transportation, and building policies can produce significant energy savings compared to the type of suburban sprawl that would likely take place if development decisions were made strictly according to market forces. In the last 25 years in the United States the amount of land consumed for development, and vehicle miles traveled have both increased far more than can be explained by population growth. An article in "Urban Land" magazine published in June 2004 reported that between 1982 and 1997 the population of the United States grew 17 percent. However, during this period the amount of urbanized land increased by 47 percent. Low intensity development and the more numerous and longer automobile trips related to this pattern of development are contributing to increased energy use. Because Leesburg does not have the population or densities needed to support traditional public transit, the Town should explore the use of more compact and mixed development patterns to reduce the length of trips, and enable more trips to be made by bicycle transit, or on foot. The Town could also encourage energy savings for heating and cooling by providing incentives for "green building" or encouraging builders to construct buildings according to the LEED (Leadership in Energy and Environmental Design) green building standards.

Accomplishments: No significant implementation actions have occurred.

Related Community Issues and Comments: There were few relevant comments collected. These comments related to achieving energy conservation through "green building" and meeting the LEED standards, which are achieved through energy efficient architecture and selecting appropriate building materials.

Conclusion: Governmental and societal decisions about transportation and the use of natural resources for energy production, as well as countless personal decisions about what to drive and where to live and how big a house to buy or at what temperature to set the thermostat have great impacts on energy consumption. These factors are more significant than the amount of energy that can be saved through land use planning or good site design. The plan should not to create the expectation that implementing its policies can achieve the amount of energy savings that federal vehicle mileage standards and other regulations do. Nevertheless, designing a community to conserve energy by providing transportation options, pedestrian friendly neighborhoods, non-motorized links to retail and employment locations and construction of green buildings, can, over time, result in a community that uses much less energy than one built without these characteristics.

The federal government's imposition of energy efficiency standards for everything from refrigerators to automobiles has helped to slow the increase in energy consumption. As energy costs rise, the market place will also play a role in conservation leading to more energy efficient offices and homes. It is appropriate for the plan to promote energy conservation through thoughtful site planning, building orientation and mixed use development, but the plan must also recognize that implementing such policies will at times be difficult when they conflict with other land use and design compatibility issues and with the public's preference for conventional, sprawling suburban development.

Recommendation: The environmental element should establish a set of policies that encourage energy savings through mixed-use development, non-motorized circulation, green building, solar orientation, and more compact development forms, where appropriate. Many or all of the these policies may parallel objectives in the land use, design and transportation elements, which is appropriate because the goals they are trying to achieve overlap with goals in these other areas of interest. The plan should also reflect that energy conservation planning is the single most significant contribution that the Town can make to regional air quality.

## Solid Waste Management

The Town's solid waste and recycling programs are summarized, and the 25 percent recycling goal is noted. Because, there is no landfill within the Town, the Town's solid waste management program has little relevance for the physical planning of the Town, but to the extent that solid waste from the Town fills the Loudoun County landfill, it does impact the region.

The goals and objectives section in the environmental element lists five objectives and three policies under solid waste management. The objectives call for: increased recycling, prohibiting illegal dumping, volunteer led cleanups of liter and illegal dump sites, recycling of oil and car batteries, and encouraging environmentally responsible purchasing of high recycled content and biodegradable products. However, none of these statements sets an objective. Only the second of the three policies in this section commits the town to seeking alternatives to conventional land filling of solid

waste. The first and third call for periodic program review and identifying vendors who provide products with a high recycled materials content.

Accomplishments: The Environmental Advisory Commission has closely monitored the Town's solid waste collection program, particularly the performance of the recycling component of that program. The Town has met and recently exceeded the 25 percent recycling goal.

Related Community Issues and Comments: The Heritage High School students identified a need for additional public trashcans and recycling receptacles. At another community input session, a comprehensive recycling program was requested.

Conclusion: There are significant environmental challenges related to solid waste management, particularly the air quality, ground and surface water quality, visual impacts and land use compatibility issues associated with land filling. Leesburg however, does not have a landfill. Recycling is the best available tool that local governments have to reduce the volume of the waste stream going to the landfill. The Town already has a successful recycling program; having recently exceeded the goal of 25 percent recycled content for the Town's solid waste stream. Recycling is not much impacted by land use decisions. The recycling program is largely accomplished through a Town contract with a waste collector, and a well-run public education program. The topic of solid waste management would more appropriately be located in the public services element of the plan.

Recommendation: Locate the solid waste management section in the government facilities & services element. Consider a more aggressive recycling goal.

## Community Issues not Addressed in the 1997 Town Plan

Some of the community recommendations are not addressed or are only partially addressed in the 1997 Town Plan. These issues tend to be broad and thematic. Several recommendations call for a more systematic approach to open space, calling for a better definition of open space, and a town-wide approach to identification and preservation of ecological resources. Other related recommendations call for coordination between the Town and the County in open space planning. In a related and more specific issue/problem area identified during a visioning session, opportunities for better planning along the Tuscarora Creek corridor were emphasized.

Several comments call for an environmental regulations audit, which would review Town codes and standards to determine whether they conflict with environmental protection goals. The "Large Group" of the environmental visioning session called for an "Environmental Management System." Whatever such systems are called, auditing existing regulations and monitoring progress toward plan implementation are appropriate and necessary exercises. Because these are implementation actions, they should follow plan adoption. They can be broken down into a series of individual implementation efforts in an action plan that can be adopted after the new town plan is completed. Such a system should also be designed to monitor progress toward implementing the environmental objectives adopted as part of the new plan. The challenge in developing a monitoring system is identifying parameters that can be measured, and that are directly correlated with plan objectives. Examples of effective parameters are acres of open space protected per year or feet of stream bank protection measures installed. A poor example would be loss of forest cover in the Town. Some loss is inevitable as the remaining vacant land in the Town develops. The Town Plan assumes that

most undeveloped, privately owned land will be converted to urban uses. This outcome, although it results in some loss of forest canopy, is on balance consistent with Plan goals. Acres reforested and acres of woodland protected would be more appropriate measures of Plan implementation for tree canopy. If there were money to spend, some water quality trends could be monitored by sample collection and chemical analysis. This effort could dovetail with Town efforts to document progress in meeting water quality regulations under its obligations to the National Pollutant Discharge Elimination System (NPDES) or total maximum daily load (TMDL) limits, if they are established for the streams in the Town.

Another set of recommendations calls for a systematic approach to ensure environmental protection from new development, which several community participants term "low impact development." This concept, whether called "low impact development," "minimal impact development," or "conservation site design," addresses environmental protection at the site development project level. While traditional approaches to environmental planning focus on off-site impacts, a minimum impact development approach to environmental assessment applies conservation principles to an application property on individual site plans and subdivision lots. Both approaches, the assessment of macro-scale and micro-scale impacts, are needed to fully address the environmental impacts of new development.

A final grouping of community comments deals with aesthetics generally and with view sheds specifically. There is enough topography in Leesburg to create significant opportunities for vistas. An assessment of vulnerable view sheds should be undertaken, and design standards established to protect these views. However, the environmental element may not be the appropriate venue for view shed analysis. View shed analysis and policy development would be more appropriately located in the cultural resources element or in a new urban design element.

Conclusion: Several of the community recommendations discussed in this section should be used to guide preparation of the natural resources element or be carried forward as action agenda items to implement the objectives of the new plan.

Recommendation: The natural resources element should provide a systematic approach to identifying, preserving and restoring the natural open space portions of a greenways infrastructure for the Town. The Tuscarora Creek and its Town Branch should be the centerpiece of these policies. Subsequent to Plan adoption, an environmental management system with monitoring protocols should be adopted to aid in implementing the environmental objectives of the Plan. The natural resources element should also establish minimum impact development policies to ensure that the environmental impacts of new development are minimized.

## Summary of Other Plan's Guidance on Natural Resources

### The Loudoun County General Plan

The Loudoun County General Plan organizes its natural resources management guidance around a principle that the Loudoun Plan calls "Green Infrastructure." In Chapter 2, "Planning Approach," under the heading "General Plan Strategies," the Loudoun Plan says: "An overarching change in this Plan is the integration of Loudoun's natural, environmental, cultural and heritage resources into a unified Green Infrastructure strategy. The Green Infrastructure will shape land uses throughout the

County in all policy areas. It will be a structuring element of development, with its features becoming a part of every new project through the use of conservation design as the preferred project planning technique. The County is committed to the preservation and enhancement of its Green Infrastructure assets for their economic value and contribution to the quality of life of present and future residents."

The third paragraph of the introductory section (unlabeled) of Chapter 5 of the Loudoun Plan, "The Green Infrastructure: Environmental, Natural, and Heritage Resources," establishes the primacy of natural and heritage resources as a tool in guiding land use planning. The Loudoun Plan states that "In all future land use planning, the framework of the Green Infrastructure will guide where and how development and redevelopment occurs." This is a guiding principal in planning first espoused by Ian McHarg in his classic work Design With Nature and perfected in its application to physical planning by more recent pioneers like Randall Arendt in publications such as Rural By Design. This philosophical approach called conservation design is implemented by assessing the natural character of development sites and their environs, and designing projects that both respect and preserve the ecologically significant areas on site and the natural systems in the region.

The structure of the Loudoun Plan is quite different from the 1997 Town Plan. Of particular interest to this paper is the lack of goals and objectives throughout the Loudoun Plan. Almost all guidance is in the form of policies. Chapter 5, which covers natural resource and environmental issues, also includes the discussion of the County's heritage resources, which are included as parts of the green infrastructure. The 1997 Town Plan covers heritage resources in the historic preservation and urban design element.

Like the 1997 Town Plan, the Loudoun Plan provides policies for a number of individual topics. Unlike the 1997 Town Plan these topics are organized into four groups. These are: "Natural Resource Assets," "Heritage Resource Assets," "Open Space Assets" and "Complementary Elements." The first and third groups have much to do with the establishment of a natural resources management program for Loudoun County. Of particular note is the discussion of "River and Stream Corridor Resources." These open space corridors include all streams with 100 acre or larger watersheds, associated 100-year flood plains, wetlands, riparian forests, and flexible buffer areas. These criteria, which are very similar to Fairfax County's "Environmental Quality Corridor" delineation criteria, are an effective definition of the extent of the stream valley, and could serve as a model for Leesburg.

The Loudoun Plan, like the 1997 Town Plan, provides guidance for geologic and soil resources, steep slopes, forests, trees and vegetation, wildlife habitat, air quality, lighting, and airport and highway noise. For each of these topics the Loudoun Plan lists numerous policies, but no goals or objectives. This is a shortcoming. In addition, many of the listed policy statements are programmatic, assuming a particular solution to each policy. An objectives-based approach, which does not lock stakeholders into a single solution to an issue, is more in keeping with planning practice.

Conclusion: Three principles from the Loudoun Plan provide an effective set of strategies for the new Leesburg Town Plan. In particular the Loudoun Plan: 1) establishes a conservation design philosophy as the tool to ensure environmentally sensitive development review; 2) suggests a framework for a green infrastructure; and, 3) recommends that watersheds and stream corridors serve as the backbone for this infrastructure. The Loudoun Plan also includes heritage resources as

elements of the county's green infrastructure. The connection between heritage and natural resources is not argued effectively. In Leesburg, historic preservation and heritage resources management are of such importance that the program should stand alone as an element of the new town plan.

Recommendation: Design the natural resources management objectives of the natural resources element around the three principles noted above. When the text of the new element is written, the policies in the Loudoun Plan can be reviewed in detail to determine if individual program recommendations could be applicable to the Town. Prepare a separate heritage resources management element for the new plan.

### Comprehensive 20-Year Parks, Recreation, Open Space, Trails, and Greenways Master Plan

The parks plan provides an inventory of existing parks in the Town and the urban growth area (UGA), and an assessment of future park needs for the Town. The parks plan also provides an inventory of environmental conditions that are relevant to parks planning, including stream corridors, floodplains, wetlands, and steep slopes. The parks plan calls for protection of the Potomac River and the stream valley corridors, including "maintaining and/or restoring critical buffers." Areas with existing open space that could provide opportunities for the development of future parks are mapped, and the Town's stream corridors are identified as locations for future greenways. Implementations strategies are listed, including dedication through the development review process, which is particularly relevant to the Town Plan implementation process.

Conclusion: The parks plan provides guidance for the preservation of stream valleys, the acquisition of open space, and the establishment of stream buffers and greenways which is consistent with the polices of the 1997 Town Plan.

Recommendation: The natural resources element of the new Town Plan should support by reference the relevant sections of the parks plan.

### VPDES Phase II Stormwater Management Plan

Leesburg's VPDES (Virginia Pollutant Discharge Elimination System) stormwater management plan provides a framework for the development of a stormwater quality mitigation program for the Town. This stormwater management plan includes a five-year schedule of best management practices (BMP) implementation, which will be necessary to keep the Town's VPDES permit in compliance with water quality regulations. The stormwater management plan includes public education, public participation, illegal discharge elimination, construction site runoff control, post construction runoff control and pollution prevention control measures.

Conclusion: The VPDES stormwater management plan is consistent with the water quality objectives of the 1997 Town Plan.

Recommendation: The natural resources element of the new Town Plan should support the VPDES stormwater management plan as an implementation program for the protection of the Town's water resources.

## Existing Conditions, Trends, and Changes

In the years since the 1997 Town Plan was written and adopted, Leesburg has continued to develop. New research has more closely linked the impacts of new development to the quality of local streams, the Potomac, and the Chesapeake Bay. Projects have been undertaken to protect watersheds, and state and federal regulations now require the town to implement water quality protection measures such as BMPs. The Metropolitan Washington region continues to fall short of the standards of the Clean Air Act. A large percentage of Leesburg's tree canopy has been removed as a large part of Leesburg's land area has been developed.

### Tree Cover, Habitat, and Open Space

As this report is written, most of the land within the boundaries of the Town of Leesburg has been developed, or is the subject of an application for development approval. While there is more undeveloped land within the Urban Growth Area (UGA), most of this land has been altered by forestry and agricultural activity. Map 1 illustrates the paucity of forest canopy that exits in Leesburg today. Most of the UGA will also be converted to urban uses in the next 20 years. Figures 1 and 2, prepared from aerial photography for the Town by the non-profit advocacy group American Forest, illustrate the changes in Leesburg's land cover between 1992 and 2001. No doubt much of this conversion of forest and agricultural land occurred after the 1997 Town Plan was published. The pie charts on these graphics show that developed land in the Town increased form 26 percent of the land area to 55 percent during this period. Likewise, forested land decreased from 28 percent to 8 percent of the town's land area.

These figures should not be interpreted to conclude that this new development was inappropriate. However, the rate at which land has been converted does create a sense of urgency about the need to have policies in place to protect ecologically valuable land through the development process. The speed with which Leesburg's forests have been removed also illustrates the need for the Town to develop a restoration program for its tree canopy.

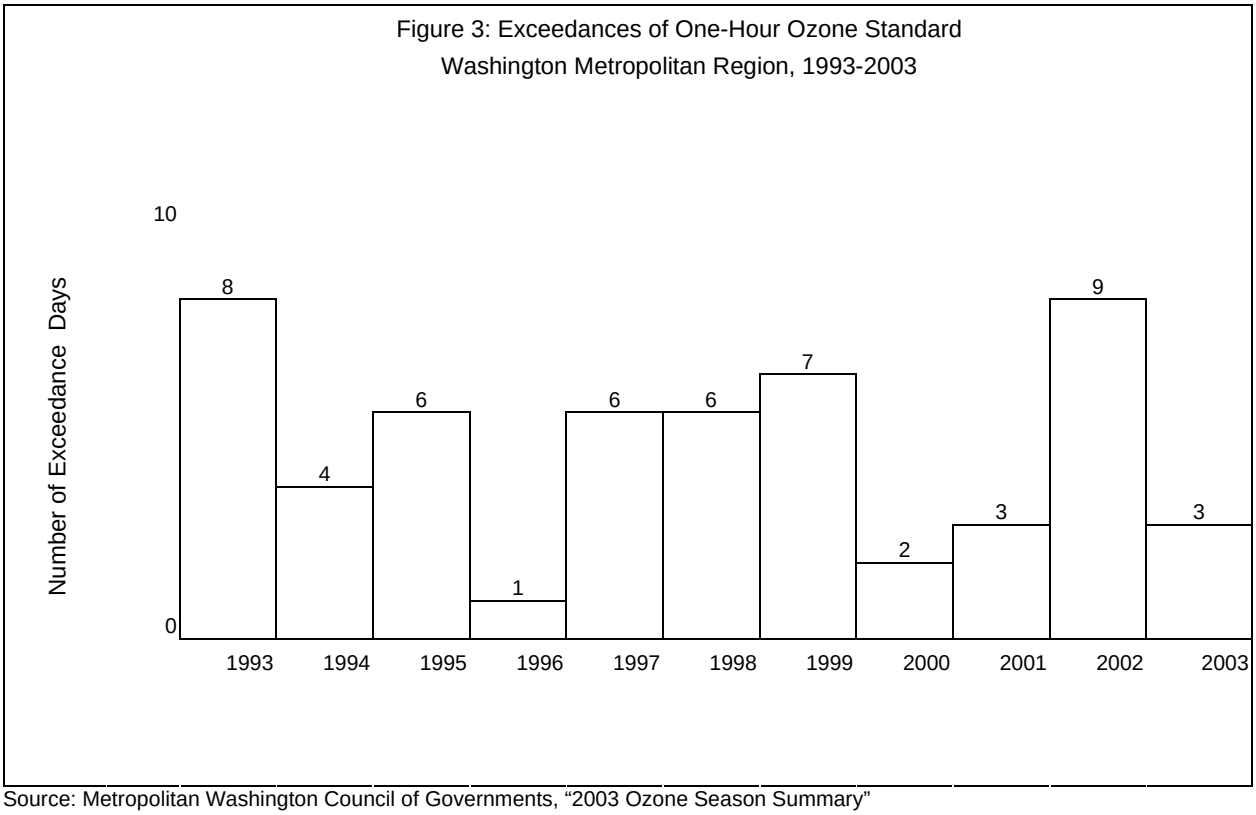
### Air Quality and Energy

Leesburg is a small part of the metropolitan Washington region for air quality planning purposes. Air quality regulations promulgated under the Clean Air Act require that local governments manage air quality for pollutants such as oxides of nitrogen, carbon monoxide, sulfur dioxide, and ozone, which result mostly from the combustion of fossil fuels for transportation, electrical generation, and space heating. The metropolitan Washington region is in "non-attainment" for ozone according to the provisions of the Clean Air Act. Figures 3 and 4 show the number of days that the one-hour and eight-hour standard for maximum ozone concentration has been exceeded in recent years. The results indicate that there is a continuing problem, but no discernable trend. In general summers with a preponderance of hot, humid weather have more days during which air quality standards are exceeded.

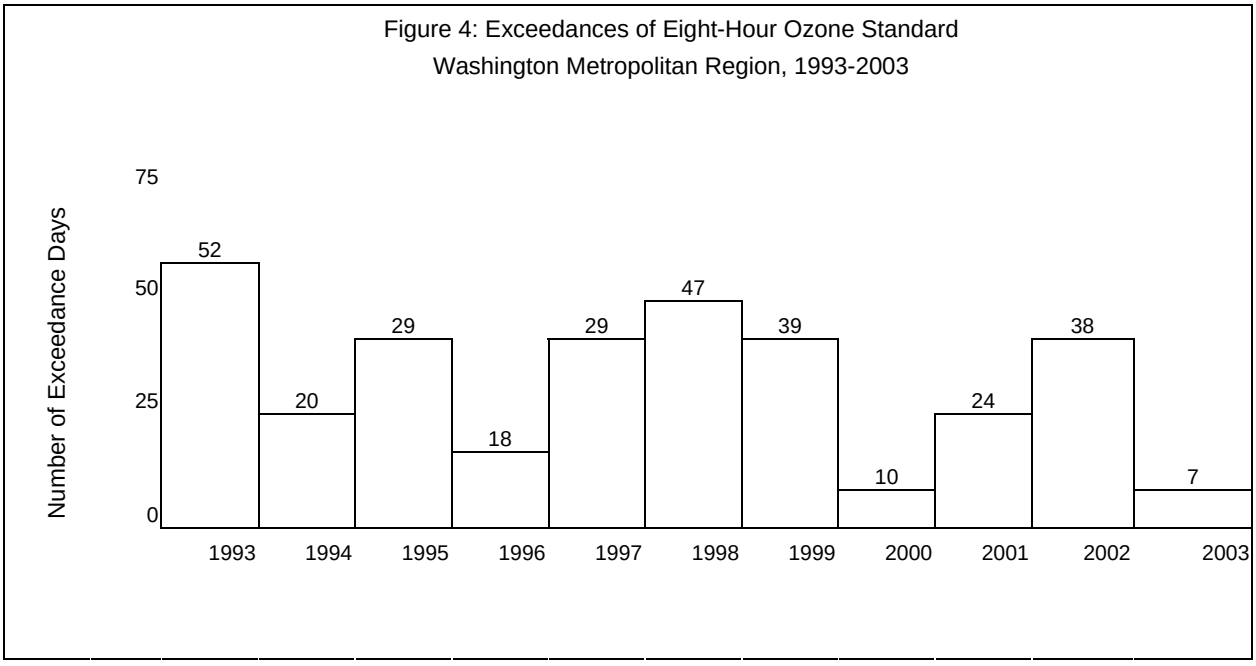
MAP 1: Leesburg Forest Cover

Figure 1: Leesburg Land Cover 1992

Figure 2: Leesburg Land Cover 2001




Source: Metropolitan Washington Council of Governments, "2003 Ozone Season Summary"




Source: Metropolitan Washington Council of Governments, "2003 Ozone Season Summary"

The most effective tools for air quality management are regulatory. For example, the federal government has established emission standards for vehicles and industries. The Metropolitan Washington Council of Governments is responsible for air quality planning in this region. This body tracks air quality trends for the region and coordinates policy development for the participating jurisdictions. As noted in an earlier section of this paper, the range of actions available to Leesburg to affect air quality is limited. However, some planning and land use decisions that the Town makes do have an effect on energy usage, which in turn is directly related to air quality. For example land use decisions that reduce the number of automobile trips or miles driven conserve energy and reduce emissions. Energy conscious site design and building techniques that reduce heating and cooling requirements conserve energy, which in turn also reduces the emissions of air pollutants.

**Water Quality and Stream Protection:**

Maps 2 and 3 show the distribution of water resources and wetlands in Leesburg and its UGA.

The Federal Clean Water Act and the regulations written to implement it have had significant impacts on local governments. The sewage treatment standards that Leesburg's wastewater treatment plant is required to meet are established by permit to address the requirements of the Clean Water Act. Last year Leesburg applied for its first Virginia Pollution Discharge Elimination System Permit (VPDES), which requires the Town to begin the process of managing non-point source pollution that enters the Town's storm drainage systems. In another regulatory process, a total maximum daily load (TMDL) standard has been established for Goose Creek to regulate and reduce the amount of sediment in the creek.

As this paper is written, Leesburg's Environmental Advisory Commission is supporting a grant application prepared by the Piedmont Environmental Council to fund the initiation of watershed planning for the Town. If approved and funded, this project will continue the work started under the Goose Creek Watershed Assessment process conducted by the Center for Watershed Protection in 2002 and 2003. The Goose Creek project developed subwatershed management plans for three subwatersheds in the northwestern and far western parts of the Goose Creek watershed. The current proposal would prepare plans for the subwatersheds located partly or wholly in the Town. The Tuscarora Creek watershed is divided into 3 subwatersheds, which are strongly influenced by impervious cover. The Tuscarora watershed is a small part of the Goose Creek watershed.

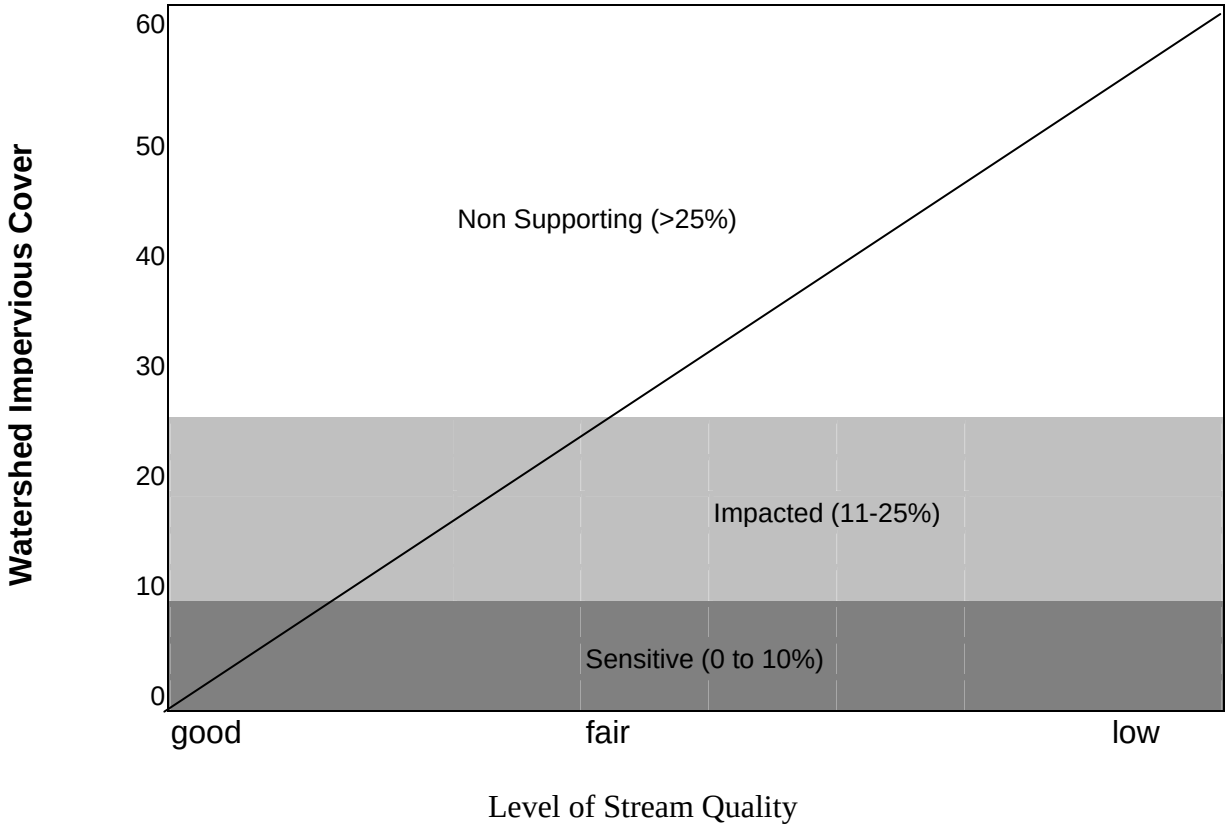
Research conduced by the Center for Watershed Protection and illustrated by Figure 5 has documented a close correlation between percent impervious cover in watersheds and stream quality as measured by species diversity and stream channel structure. Field research has shown that when the watershed of a stream has more than 10% impervious cover (parking lots, roads, roof tops, driveways, etc), impacts to the stream become obvious and significant. Stream bank erosion accelerates, and the number of macro-invertebrate species, a measure of biological health for the stream, declines. A stream with a watershed more than 10 percent impervious is "impacted." As the watershed becomes more impervious, impacts worsen. At 25 percent imperviousness, the stream becomes "non-supporting" for aquatic life, and significant human intervention is required to maintain stream channel geometry. According to the Goose Creek Watershed Assessment conducted by the Center for Watershed Protection the two Tuscarora subsheds located in Leesburg are 15 and 22 percent impervious, and both will be over 30 percent impervious after buildout. This means that the portion of the Tuscarora within the Town limits will be a non-supporting

Map 2: Leesburg Water Resources

Map 3: Leesburg Wetlands

watercourse. Based on the expectation that land in these sub basins will continue to develop, steam quality degradation is inevitable. However, there are many mitigation measures that can be applied to improve urban stream sections to make them amenities for the Town and to protect water quality down stream.

**Figure 5: Relationship Between Impervious Cover and Stream Quality**




Source: Center for Watershed Protection, "Goose Creek Vulnerability Analysis"

No other component of the natural environment is so directly impacted by land use activities, as are the Town's water resources. For this reason, plan recommendations must make water quality and stream protection a priority.

## Findings: Priority Issues for the New Natural Resources Element

The following is a summary of findings and conclusions resulting from the preceding analysis and will be used to give direction to the new town plan. This analysis considers the content of the 1997 Town Plan, the themes recommended by Leesburg's citizens and commissions, the Loudoun County General Plan, existing conditions, and recent developments in environmental protection practice and law. The findings are followed by proposed goals and objectives for the new element.

**Finding:** The current structure of the environmental element of the 1997 Town Plan does not merit retention in a new natural resources element. The body of the current environmental element

does not provide a systematic framework for identifying, prioritizing, or preserving Leesburg's natural environment. As noted earlier in this paper, the four general objectives found in the goals and objectives section of the element provide an excellent sketch of what a plan's environmental element ought to do. However, the body of the element, and the other objectives and policies do little to integrate these objectives into the Plan. The community comments, and the criticisms discussed above can best be addressed by structuring the new natural resources element according to the following additional findings.

**Finding:** The natural resources element of the new plan should provide criteria to define the boundary between places where the landscape may be altered for human occupation and those places best left to nature or designated for restoration. These criteria should be consistent with a level of expectation for ecological conservation that is appropriate for Leesburg. For example, while it can be argued that 100 percent of the natural landscape has value, unless we are preparing a master plan for a wildlife refuge, we cannot reasonably propose that all of Leesburg's natural areas be preserved. From the point of view of another extreme that upholds a single-minded devotion to private property rights, all remaining privately owned land should be available for development. Both perspectives are exaggerations. The natural resources element must find an appropriate middle ground, recognizing that Leesburg is neither Yellowstone nor lower Manhattan. The planning process should establish a set of criteria for dividing Leesburg into developable and natural areas that planners, citizens, landowners, and decision-makers can agree to.

**Finding:** The natural resources element should prioritize its recommendations by topic, and emphasize recommendations for those things over which the Town has some control. For example, the Town could implement stream buffers upstream of the current ordinance requirement. However, the plan cannot reasonably recommend that automobiles exceed federal air quality standards.

**Finding:** Some of our natural resources are highly impacted by land use decisions. For example, increasing the amount of impervious surface in a watershed results in a predictable decline in stream quality for receiving water resources. For some other resources, the impacts of land use decisions are subtle. For example, energy conscious building design and site planning can have a modest impact on overall energy usage. Planning more mixed use centers, increasing transit options, and road improvements that foster better traffic flow will benefit air quality, but these benefits will be difficult to quantify. The natural resources element where practical should give an indication about how much of an impact following its policies will likely have, and whether this impact can be measured.

**Finding:** The plan should recognize that state and federal air and water quality regulations will apply to the Town. Plan policies should be developed to be consistent with and take advantage of these requirements. The Town should recognize that although Leesburg is only a small part of a large metropolitan area, all of the jurisdictions in the region would benefit from the implementation of environmental remediation measures undertaken by any of its neighbors.

**Finding:** The new plan should link the natural resources element to the land use element and facilitate implementation of environmental policies through the development review process. If the land use element is structured to apply density or floor area ration (FAR) ranges to specific parcels for new development, rezoning and special exception applicants can be persuaded to implement the policies of the plan to achieve development intensities above an established minimum threshold.

For example, assume a hypothetical 11-acre parcel is planned for 2 to 4 homes per acre. The planner reviewing the application applies site analysis policies in the plan and delineates a proposed 3.5-acre natural resources conservation area. The land use element would give the landowner the ability to relocate the density attributed to the 3.5 acres to the buildable 8.5 acres of the same parcel. The Town should expect the applicant to honor this request as a condition of approval.

**Finding:** The natural resources element should note that most environmental impact issues could be sorted into three categories. The first category is loss of the natural landscape as a result of human activity. The second is pollution's impact on the environment (water and air pollution, habitat destruction, etc). The third is the impact of the natural or man-made environment on other humans (airport and highway noise, building on problem soils and geologically constraining features, etc). The natural resources element should be structured in relation to this division because the plan's goals and objectives for these three areas are different. The first set of issues has much to do with the physical plan of the Town. Humanity's impacts on nature have everything to do with defining an appropriate boundary between man and nature. That boundary will define the geography of the natural open space elements of the greenway system for the Town.

The 1997 Town Plan listed "principal environmental concerns for Leesburg." From that list, water-related resources, natural vegetation and wildlife habitats are examples of the first set of concerns. These are issues that, when properly addressed, limit humanity's impact on nature. Issues from the 1997 Town Plan such as geology and soils, and airport and highway noise deal with impacts of the natural environment and transportation on people. These issues are constraints to development that can be mitigated except in extreme cases, and therefore, have less to do with the physical planning of the Town. The other listed topics-- steep and moderately steep terrain, tree preservation (only as it pertains to a street tree program) and solid waste management should not be brought forward as separate topics in the new natural resources element. As discussed earlier, steep slopes should be included in a section that treats open space systematically. Tree planting and maintenance (distinct from the question of forest canopy) is more related to urban design or considered as a future utility. Solid waste management should be located in the government facilities and services element.

**Finding:** The natural resources element should feature an open space preservation and restoration policy, which will be implemented mostly through the development review process and the capital improvements program (CIP). Water resources should provide the framework for this system. The natural resources element should show that streams, steep slopes, wetlands, and habitat areas are all interdependent component parts of a natural open space system. Similar geomorphologic processes formed each of these features and most are located in or related to stream corridors. Leesburg has taken a significant first step in implementing this system by adopting the creek valley buffers article in the Zoning Ordinance. The open space delineation criteria developed for the plan can be used to build onto these buffers resulting eventually in a network of ecologically valuable open space corridors throughout the Town.

**Finding:** The Natural Resources Element should propose a single, high level of environmental protection, rather than a set of options for testing for the scenario development and testing exercises of the planning process, in order to set a high level of expectations for the community. In other words, policies for open space preservation, water quality protection, and noise mitigation would be applied equally to each of several scenarios being developed as options for the new land use plan.

**Finding:** The environmental recommendations of the Loudoun County Revised General Plan have been analyzed to determine the utility of its policies for use in crafting the environmental objectives of the natural resources element. The goals and objectives in the natural resources element should parallel the Loudoun County Plan wherever there is similar intent. Every attempt will be made to develop similar policies for the Town, or in cases where this is not possible, the plan should provide for an effective transition between the interests of the County and the Town.

## Draft Goals and Objectives for the New Natural Resources Element

A primary purpose of the natural resources element of the new town plan should be to help stakeholders make decisions that take into account the impact of new development on nature and minimize the impact of this development on natural systems. In order to do this the community and its decision makers must have achieved a consensus on the following points:

- Leesburg has a significant inventory of natural assets that can be protected or restored; however,
- The level of preservation that is achievable is constrained by Leesburg's role as an urban community.

In other words it is not reasonable to expect the kind of natural resource preservation that would be appropriate for a wilderness area, but it is reasonable to protect and restore a green infrastructure of natural areas that allows a commingling of natural and human systems within the Town. To this end, the natural resources element should present criteria to help establish the boundary between places where the landscape may be altered for human occupation, and those elements of the landscape that are best left to nature or restoration.

The individual topics addressed in the natural resources element should be organized into three thematic headings:

1. Conserving natural systems
2. Minimizing environmental pollution
3. Protecting the public from environmental hazards

Under each of these headings will be a set of topics organized according to their potential impact on the quality of life in the town, and the extent to which these issues are affected by the physical development of Leesburg.

Decision makers, Town staff, and applicants should follow the policies contained in this element to delineate a boundary between those parts of the landscape that, because of their innate ecological value, should be preserved or restored, and those less sensitive areas that should be available for development. Areas that are protected will become parts of the town's open space, or "green infrastructure."

The follow draft goals and objectives are offered for discussion:

### Draft Goals:

- Leesburg will identify, protect, and restore an open space system, which will include a network of ecologically valuable lands that will protect water quality, conserve forest canopy, and provide habitat for the flora and fauna indigenous to this area.

- Leesburg will meet or exceed state and federal air and water quality standards.
- Leesburg will protect its residents from environmental hazards.

### Draft Objectives:

1. Identify, protect and restore an integrated open space network of ecologically valuable land and water resources within the Town of Leesburg and its UGA.
2. Minimize the impact of new development on natural systems by adopting minimum impact development standards and conservation subdivision design techniques.
3. Restore the forest canopy within the developed parts of Leesburg consistent with planned land use.
4. Protect and restore the ecological integrity of streams in Leesburg and its UGA.
5. Protect Goose Creek, the Potomac River and the Chesapeake Bay from the impacts of non-point source pollution.
6. Achieve energy savings and air quality benefits for the region by encouraging energy-saving site design and land use planning practices.
7. Minimize outdoor lighting consistent with public safety requirements to reduce glare and impacts on the night sky. (This issue was not identified in the 1997 Town Plan or in community comments. However, it is addressed in the Loudoun Plan.)
8. Protect people from unhealthful levels of highway and aircraft noise.
9. Design new construction to protect people and property from geotechnical and geological hazards.
10. Ensure that new development conforms to the environmental policies of the plan by conducting environmental assessments of development proposals to identify cost-effective mitigation measures for environmental impacts.
11. Establish and maintain an environmental monitoring system to measure progress toward achieving the goals of the Natural Resources Element.